

SEQUENCE LISTING

<110> ffrench-Constant, Richard
Bowen, David
Rocheleau, Thomas
Waterfield, Nicholas

<120> DNA SEQUENCES FROM PHOTORHABDUS LUMINESCENS

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<151> 2000-03-24

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<170> PatentIn version 3.0

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1670	1675	1680
Thr Asn Ile Asn Ile Thr Leu	Phe Ile Pro Leu Asp	Asp Val Pro
1685	1690	1695
Leu Asn Gln Asp Tyr His Ala	Lys Val Tyr Met Thr	Phe Lys Lys
1700	1705	1710
Ser Pro Ser Asp Gly Thr Trp	Trp Gly Pro His Phe	Val Arg Asp
1715	1720	1725
Asp Lys Gly Ile Val Thr Ile	Asn Pro Lys Ser Ile	Leu Thr His
1730	1735	1740
Phe Glu Ser Val Asn Val Leu	Asn Asn Ile Ser Ser	Glu Pro Met
1745	1750	1755
Asp Phe Ser Gly Ala Asn Ser	Leu Tyr Phe Trp Glu	Leu Phe Tyr
1760	1765	1770
Tyr Thr Pro Met Leu Val Ala	Gln Arg Leu Leu His	Glu Gln Asn
1775	1780	1785
Phe Asp Glu Ala Asn Arg Trp	Leu Lys Tyr Val Trp	Ser Pro Ser
1790	1795	1800
Gly Tyr Ile Val His Gly Gln	Ile Gln Asn Tyr Gln	Trp Asn Val
1805	1810	1815
Arg Pro Leu Leu Glu Asp Thr	Ser Trp Asn Ser Asp	Pro Leu Asp
1820	1825	1830
Ser Val Asp Pro Asp Ala Val	Ala Gln His Asp Pro	Met His Tyr
1835	1840	1845
Lys Val Ser Thr Phe Met Arg	Thr Leu Asp Leu Leu	Ile Ala Arg
1850	1855	1860
Gly Asp His Ala Tyr Arg Gln	Leu Glu Arg Asp Thr	Leu Asn Glu
1865	1870	1875
Ala Lys Met Trp Tyr Met Gln	Ala Leu His Leu Leu	Gly Asp Lys
1880	1885	1890
Pro Tyr Leu Pro Leu Ser Thr	Thr Trp Ser Asp Pro	Arg Leu Asp
1895	1900	1905
Arg Ala Ala Asp Ile Thr Thr	Gln Asn Ala His Asp	Ser Ala Ile
1910	1915	1920
Val Ala Leu Arg Gln Asn Ile	Pro Thr Pro Ala Pro	Leu Ser Leu
1925	1930	1935
Arg Ser Ala Asn Thr Leu Thr	Asp Leu Phe Leu Pro	Gln Ile Asn
1940	1945	1950
Glu Val Met Met Asn Tyr Trp	Gln Thr Leu Ala Gln	Arg Val Tyr
1955	1960	1965

Asn	Leu	Arg	His	Asn	Leu	Ser	Ile	Asp	Gly	Gln	Pro	Leu	Tyr	Leu
1970						1975					1980			
Pro	Ile	Tyr	Ala	Thr	Pro	Ala	Asp	Pro	Lys	Ala	Leu	Leu	Ser	Ala
1985						1990					1995			
Ala	Val	Ala	Thr	Ser	Gln	Gly	Gly	Gly	Lys	Leu	Pro	Glu	Ser	Phe
2000						2005					2010			
Met	Ser	Leu	Trp	Arg	Phe	Pro	His	Met	Leu	Glu	Asn	Ala	Arg	Gly
2015						2020					2025			
Met	Val	Ser	Gln	Leu	Thr	Gln	Phe	Gly	Ser	Thr	Leu	Gln	Asn	Ile
2030						2035					2040			
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2045						2050					2055			
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2060						2065					2070			
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2075						2080					2085			
Lys	Ala	Gly	Ala	Gln	Ser	Arg	Phe	Asp	Ser	Tyr	Gly	Lys	Leu	Tyr
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Asp	Glu	Asn	Ile	Asn	Ala	Gly	Glu	Asn	Gln	Ala	Met	Thr	Leu	Arg
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Val	Met	Glu	Phe	Ser	Ala	Asn	Val	Met	Asn	Thr	Glu	Ala	Asp	Lys
2165						2170					2175			
Ile	Ser	Gln	Ser	Glu	Thr	Tyr	Arg	Arg	Arg	Arg	Gln	Glu	Trp	Glu
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Ile	Gln	Arg	Asn	Asn	Ala	Glu	Ala	Glu	Leu	Lys	Gln	Ile	Asp	Ala
2195						2200					2205			
Gln	Leu	Lys	Ser	Leu	Ala	Val	Arg	Arg	Glu	Ala	Ala	Val	Leu	Gln
2210						2215					2220			
Lys	Thr	Ser	Leu	Lys	Thr	Gln	Gln	Glu	Gln	Thr	Gln	Ser	Gln	Leu
2225						2230					2235			
Ala	Phe	Leu	Gln	Arg	Lys	Phe	Ser	Asn	Gln	Ala	Leu	Tyr	Asn	Trp
2240						2245					2250			
Leu	Arg	Gly	Arg	Leu	Ala	Ala	Ile	Tyr	Phe	Gln	Phe	Tyr	Asp	Leu
2255						2260					2265			

Ala Val Ala Arg Cys Leu Met Ala Glu Gln Ala Tyr Arg Trp Glu
 2270 2275 2280
 Leu Asn Asp Asp Ser Ala Arg Phe Ile Lys Pro Gly Ala Trp Gln
 2285 2290 2295
 Gly Thr Tyr Ala Gly Leu Leu Ala Gly Glu Thr Leu Met Leu Ser
 2300 2305 2310
 Leu Ala Gln Met Glu Asp Ala His Leu Lys Arg Asp Lys Arg Ala
 2315 2320 2325
 Leu Glu Val Glu Arg Thr Val Ser Leu Ala Glu Val Tyr Ala Gly
 2330 2335 2340
 Leu Pro Lys Asp Asn Gly Pro Phe Ser Leu Ala Gln Glu Ile Asp
 2345 2350 2355
 Lys Leu Val Ser Gln Gly Ser Gly Ser Ala Gly Ser Gly Asn Asn
 2360 2365 2370
 Asn Leu Ala Phe Gly Ala Gly Thr Asp Thr Lys Thr Ser Leu Gln
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 Ala Ser Val Ser Phe Ala Asp Leu Lys Ile Arg Glu Asp Tyr Pro
 2390 2395 2400
 Ala Ser Leu Gly Lys Ile Arg Arg Ile Lys Gln Ile Ser Val Thr
 2405 2410 2415
 Leu Pro Ala Leu Leu Gly Pro Tyr Gln Asp Val Gln Ala Ile Leu
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 Ser Tyr Gly Asp Lys Ala Gly Leu Ala Asn Gly Cys Glu Ala Leu
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 2450 2455 2460
 Phe Asn Asp Gly Lys Phe Leu Pro Phe Glu Gly Ile Ala Ile Asp
 2465 2470 2475
 Gln Gly Thr Leu Thr Leu Ser Phe Pro Asn Ala Ser Met Pro Glu
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 Leu His Ile Arg Tyr Thr Ile Lys
 2510 2515

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ggc ggc ggc gct att acc ggt atg ggt gaa gca tta aca cca gcc ggg Gly Gly Gly Ala Ile Thr Gly Met Gly Glu Ala Leu Thr Pro Ala Gly 20 25 30	96
ccg gat ggt atg gcc gcc tta tcc ctg cca tta ccc att tcc gcc ggg Pro Asp Gly Met Ala Ala Leu Ser Leu Pro Leu Pro Ile Ser Ala Gly 35 40 45	144
cgt ggt tac gca ccc tcg ctc act ctg aat tac aac agt gga acc ggt Arg Gly Tyr Ala Pro Ser Leu Thr Leu Asn Tyr Asn Ser Gly Thr Gly 50 55 60	192
aac agc cca ttt ggt ctc ggt tgg gac tgc ggc gtc atg gca att cgt Asn Ser Pro Phe Gly Leu Gly Trp Asp Cys Gly Val Met Ala Ile Arg 65 70 75 80	240
cgt cgc acc agt acc ggc gta ccg aat tac gat gaa acc gat act ttt Arg Arg Thr Ser Thr Gly Val Pro Asn Tyr Asp Glu Thr Asp Thr Phe 85 90 95	288
ctg ggg ccg gaa ggt gaa gtg ttg gtc gta gca tta aat gag gca ggt Leu Gly Pro Glu Gly Glu Val Leu Val Val Ala Leu Asn Glu Ala Gly 100 105 110	336
caa gct gat atc cgc agt gaa tcc tca ttg cag ggc atc aat ttg ggt Gln Ala Asp Ile Arg Ser Glu Ser Ser Leu Gln Gly Ile Asn Leu Gly 115 120 125	384
gcg acc ttc acc gtt acc tgt tat cgc tcc cgc cta gaa agc cac ttt Ala Thr Phe Thr Val Thr Cys Tyr Arg Ser Arg Leu Glu Ser His Phe 130 135 140	432
aac cgg ttg gaa tac tgg caa ccc caa aca acc ggc gca acc gat ttc Asn Arg Leu Glu Tyr Trp Gln Pro Gln Thr Thr Gly Ala Thr Asp Phe 145 150 155 160	480
tgg ctg ata tac agc ccc gac gga cag gtc cat tta ctg ggc aaa aat Trp Leu Ile Tyr Ser Pro Asp Gly Gln Val His Leu Leu Gly Lys Asn 165 170 175	528
cct cag gca cgt atc agc aat cca ctc aat gtt aac caa aca gcg caa Pro Gln Ala Arg Ile Ser Asn Pro Leu Asn Val Asn Gln Thr Ala Gln 180 185 190	576
tgg ctg ttg gaa gcc tcg ata tca tcc cac agc gaa cag att tat tat Trp Leu Leu Glu Ala Ser Ile Ser Ser His Ser Glu Gln Ile Tyr Tyr 195 200 205	624
caa tat cgc gct gaa gat gaa gca ggt tgt gaa acc gac gag cta gca Gln Tyr Arg Ala Glu Asp Glu Ala Gly Cys Glu Thr Asp Glu Leu Ala 210 215 220	672
gcc cac ccc agc gca acc gtt cag cgc tac ctg caa aca gta cat tac Ala His Pro Ser Ala Thr Val Gln Arg Tyr Leu Gln Thr Val His Tyr 225 230 235 240	720
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Gly Asn Leu Thr Ala Ser Asp Val Phe Pro Thr Leu Asn Gly Asp Asp			
245	250	255	
cca ctt aaa tct ggc tgg atg ttc tgt tta gta ttt gac tac ggt gag			816
Pro Leu Lys Ser Gly Trp Met Phe Cys Leu Val Phe Asp Tyr Gly Glu			
260	265	270	
cgc aaa aac agc tta tct gaa atg ccg ctg ttt aaa gcc aca ggc aat			864
Arg Lys Asn Ser Leu Ser Glu Met Pro Leu Phe Lys Ala Thr Gly Asn			
275	280	285	
tgg ctt tgc cga aaa gac cgt ttt tcc cgt tat gag tac ggt ttt gaa			912
Trp Leu Cys Arg Lys Asp Arg Phe Ser Arg Tyr Glu Tyr Gly Phe Glu			
290	295	300	
ttg cgt act cgc cgc tta tgc cgc caa ata ctg atg ttt cac cgt cta			960
Leu Arg Thr Arg Arg Leu Cys Arg Gln Ile Leu Met Phe His Arg Leu			
305	310	315	320
caa acc cta tct ggt cag gca aag ggg gat gat gaa cct gcg cta gtg			1008
Gln Thr Leu Ser Gly Gln Ala Lys Gly Asp Asp Glu Pro Ala Leu Val			
325	330	335	
tcg cgt ctg ata ctg gat tat gac gaa aac gcg atg gtc agt acg ctc			1056
Ser Arg Leu Ile Leu Asp Tyr Asp Glu Asn Ala Met Val Ser Thr Leu			
340	345	350	
gtt tct gtc cgc cgg gta ggc cat gag gac aac aac acg gtt acc gcg			1104
Val Ser Val Arg Arg Val Gly His Glu Asp Asn Asn Thr Val Thr Ala			
355	360	365	
ctg cca cca ctg gaa ctg gcc tat cag cct ttt gag cca gaa caa acc			1152
Leu Pro Pro Leu Glu Leu Ala Tyr Gln Pro Phe Glu Pro Glu Gln Thr			
370	375	380	
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Ala Leu Trp Gln Ser Met Asp Val Leu Ala Asn Phe Asn Thr Ile Gln			
385	390	395	400
cgc tgg caa ctg ctt gac ctg aaa gga gaa ggc gtg ccc ggc att ctc			1248
Arg Trp Gln Leu Leu Asp Leu Lys Gly Glu Gly Val Pro Gly Ile Leu			
405	410	415	
tat cag gat aga aat ggc tgg tgg tat cga tct gcc caa cgt cag gcc			1296
Tyr Gln Asp Arg Asn Gly Trp Trp Tyr Arg Ser Ala Gln Arg Gln Ala			
420	425	430	
ggg gaa gag atg aat gcg gtc acc tgg ggg aaa atg caa ctc ctt ccc			1344
Gly Glu Glu Met Asn Ala Val Thr Trp Gly Lys Met Gln Leu Leu Pro			
435	440	445	
atc aca cca gct gtg cag gat aac gcc tca ctg atg gat att aac ggt			1392
Ile Thr Pro Ala Val Gln Asp Asn Ala Ser Leu Met Asp Ile Asn Gly			
450	455	460	
gac ggg caa ctg gac tgg gtg att acc ggg ccg ggg cta agg ggc tat			1440
Asp Gly Gln Leu Asp Trp Val Ile Thr Gly Pro Gly Leu Arg Gly Tyr			
465	470	475	480
cac agc caa cac ccg gat ggc agt tgg acg cgt ttt acg cca tta cat			1488
His Ser Gln His Pro Asp Gly Ser Trp Thr Arg Phe Thr Pro Leu His			

485	490	495	
gcc ctg ccg ata gaa tat tct cat cct cgc gct caa ctt gcc gat tta Ala Leu Pro Ile Glu Tyr Ser His Pro Arg Ala Gln Leu Ala Asp Leu 500	505	510	1536
atg gga gcc ggg ctg tcc gat tta gtg cta att ggt ccc aaa agt gtg Met Gly Ala Gly Leu Ser Asp Leu Val Leu Ile Gly Pro Lys Ser Val 515	520	525	1584
cgc tta tat gtc aat aac cgt gat ggt ttt acc gaa ggg cgg gat gtg Arg Leu Tyr Val Asn Asn Arg Asp Gly Phe Thr Glu Gly Arg Asp Val 530	535	540	1632
gtg caa tcc ggt gat atc acc ctg ccg cta ccg ggc gcc gat gcc cgt Val Gln Ser Gly Asp Ile Thr Leu Pro Leu Pro Gly Ala Asp Ala Arg 545	550	555	1680
aag tta gtg gca ttt agt gac gta ctg ggt tca ggc caa gca cat ctg Lys Leu Val Ala Phe Ser Asp Val Leu Gly Ser Gly Gln Ala His Leu 565	570	575	1728
gtt gaa gtt agt gca act caa gtc acc tgc tgg ccg aat ctg ggg cat Val Glu Val Ser Ala Thr Gln Val Thr Cys Trp Pro Asn Leu Gly His 580	585	590	1776
ggc cgt ttt ggt cag cca atc gta ttg ccg gga ttc agc caa tct gcc Gly Arg Phe Gly Gln Pro Ile Val Leu Pro Gly Phe Ser Gln Ser Ala 595	600	605	1824
gcc agt ttt aat cct gat cga gtt cat ctg gcc gat ttg gat ggg agc Ala Ser Phe Asn Pro Asp Arg Val His Leu Ala Asp Leu Asp Gly Ser 610	615	620	1872
ggc cct gcc gat ttg att tat gtt cat gct gac cgt ctg gat att ttc Gly Pro Ala Asp Leu Ile Tyr Val His Ala Asp Arg Leu Asp Ile Phe 625	630	635	1920
agc aat gaa agt ggc aac ggt ttt gca aaa cca ttc aca ctc tct ttt Ser Asn Glu Ser Gly Asn Gly Phe Ala Lys Pro Phe Thr Leu Ser Phe 645	650	655	1968
cct gac ggc ctg cgt ttt gat gat acc tgc cag ttg caa gta gcc gat Pro Asp Gly Leu Arg Phe Asp Asp Thr Cys Gln Leu Gln Val Ala Asp 660	665	670	2016
gta caa ggg tta ggc gtt gtc agc ctg atc cta agc gta ccg cat atg Val Gln Gly Leu Gly Val Val Ser Leu Ile Leu Ser Val Pro His Met 675	680	685	2064
gcg cca cat cat tgg cgc tgc gat ctg acc aac gcg aaa ccg tgg tta Ala Pro His His Trp Arg Cys Asp Leu Thr Asn Ala Lys Pro Trp Leu 690	695	700	2112
ctc agt gaa acg aac aac aat atg ggg gcc aat cac acc ttg cat tac Leu Ser Glu Thr Asn Asn Met Gly Ala Asn His Thr Leu His Tyr 705	710	715	2160
cgt agc tct gtc cag ttc tgg ctg gat gaa aaa gct gcg gca ttg gct Arg Ser Ser Val Gln Phe Trp Leu Asp Glu Lys Ala Ala Leu Ala 725	730	735	2208

acc gga caa aca ccg gtc tgt tac ctg ccc ttc ccg gtc cat acc ctt Thr Gly Gln Thr Pro Val Cys Tyr Leu Pro Phe Pro Val His Thr Leu 740 745 750	2256
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acg tta cgt tat gct cac ggc gct tgg gat gga cgt gaa ccg gaa ttt Thr Leu Arg Tyr Ala His Gly Ala Trp Asp Gly Arg Glu Arg Glu Phe 770 775 780	2352
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gcc acc gga tta cct gcg gta gat aat gcg tta tcc gcc ggg tat tgg Ala Thr Gly Leu Pro Ala Val Asp Asn Ala Leu Ser Ala Gly Tyr Trp 820 825 830	2496
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cta tac tgg tta aac ccg gcg cta aaa ggt cag cca ctg cgt agt gaa Leu Tyr Trp Leu Asn Arg Ala Leu Lys Gly Gln Pro Leu Arg Ser Glu 865 870 875 880	2640
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act gaa tcc cgt cca cag gtg cgc caa tta caa gat ggc gcc acc gtt Thr Glu Ser Arg Pro Gln Val Arg Gln Leu Gln Asp Gly Ala Thr Val 900 905 910	2736
tcc ccg gtg ctc tgg gcc tca gtc gtg gaa agc cgt agt tat cac tac Ser Pro Val Leu Trp Ala Ser Val Val Glu Ser Arg Ser Tyr His Tyr 915 920 925	2784
gaa cgt att atc agt gat ccc cag tgc aat cag gat atc acg ttg tcc Glu Arg Ile Ile Ser Asp Pro Gln Cys Asn Gln Asp Ile Thr Leu Ser 930 935 940	2832
agt gac cta ttc ggg caa cca ctg aaa cag gtt tcc gta caa tat ccc Ser Asp Leu Phe Gly Gln Pro Leu Lys Gln Val Ser Val Gln Tyr Pro 945 950 955 960	2880
cgc cgc aac aaa cca aca acc aat ccg tat ccc gat acc cta ccg gat Arg Arg Asn Lys Pro Thr Thr Asn Pro Tyr Pro Asp Thr Leu Pro Asp 965 970 975	2928

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acc tgc cga caa tcc agt tgg cac cat ctt att ggt aat gag cta aga	3024	
Thr Cys Arg Gln Ser Ser Trp His His Leu Ile Gly Asn Glu Leu Arg		
995	1000	1005
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Val Leu Gly Leu Pro Asp Gly Thr Arg Ser Asp Ala Phe Thr Tyr		
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gat gcc aaa cag gta cct gtc gat ggc tta aat ctg gaa acc ctg	3114	
Asp Ala Lys Gln Val Pro Val Asp Gly Leu Asn Leu Glu Thr Leu		
1025	1030	1035
tgt gct gaa aat agc ctg att gcc gat gat aaa cct cgc gaa tac	3159	
Cys Ala Glu Asn Ser Leu Ile Ala Asp Asp Lys Pro Arg Glu Tyr		
1040	1045	1050
ctc aat cag caa cga acg ttc tat acc gac ggg aaa aac caa aca	3204	
Leu Asn Gln Gln Arg Thr Phe Tyr Thr Asp Gly Lys Asn Gln Thr		
1055	1060	1065
ccg ctg aaa aca ccg aca cga caa gcg tta atc gcc ttt acc gaa	3249	
Pro Leu Lys Thr Pro Thr Arg Gln Ala Leu Ile Ala Phe Thr Glu		
1070	1075	1080
acg gcg gta tta acg gaa tct ctg tta tcc gcg ttt gat ggc ggt	3294	
Thr Ala Val Leu Thr Glu Ser Leu Leu Ser Ala Phe Asp Gly Gly		
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att acg cca gac gaa tta ccg gga ata ctg aca cag gcc gga tac	3339	
Ile Thr Pro Asp Glu Leu Pro Gly Ile Leu Thr Gln Ala Gly Tyr		
1100	1105	1110
caa caa gag cct tat ctg ttt cca cgc acc ggc gaa aac aaa gtt	3384	
Gln Gln Glu Pro Tyr Leu Phe Pro Arg Thr Gly Glu Asn Lys Val		
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1175	1180	1185
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Phe Leu Thr Pro Thr Gln Leu Thr Asp Ile Asn Asp Asn Val His		
1190	1195	1200
ctc atc acc ttg gat gct ctg gga cgc cct gtc acg caa cgt ttc	3654	

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Trp	Gly	Ile	Glu	Ser	Gly	Val	Ala	Thr	Gly	Tyr	Ser	Ser	Ser	Glu	
1220						1225					1230				
gaa	aaa	cca	tcc	tct	cca	cca	aac	gat	atc	gat	acc	gct	att	aat	3744
Glu	Lys	Pro	Phe	Ser	Pro	Pro	Asn	Asp	Ile	Asp	Thr	Ala	Ile	Asn	
1235						1240					1245				
cta	acc	gga	cca	ctc	cct	gtc	gca	cag	tgt	ctg	gtc	tat	gca	ccg	3789
Leu	Thr	Gly	Pro	Leu	Pro	Val	Ala	Gln	Cys	Leu	Val	Tyr	Ala	Pro	
1250						1255					1260				
gac	agt	tgg	atg	cca	cta	tcc	agt	caa	gaa	acc	tcc	aac	aca	tta	3834
Asp	Ser	Trp	Met	Pro	Leu	Phe	Ser	Gln	Glu	Thr	Phe	Asn	Thr	Leu	
1265						1270					1275				
acg	cag	gaa	gag	cag	gag	acg	ctg	cgt	gat	tca	cgt	att	atc	acg	3879
Thr	Gln	Glu	Glu	Gln	Glu	Thr	Leu	Arg	Asp	Ser	Arg	Ile	Ile	Thr	
1280						1285					1290				
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Glu	Asp	Trp	Arg	Ile	Cys	Ala	Leu	Thr	Arg	Arg	Arg	Trp	Leu	Gln	
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Ser	Gln	Lys	Ile	Ser	Thr	Pro	Leu	Val	Lys	Leu	Leu	Thr	Asn	Ser	
1310						1315					1320				
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Ile	Gly	Leu	Pro	Pro	His	Asn	Leu	Thr	Leu	Thr	Thr	Asp	Arg	Tyr	
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Asp	Arg	Asp	Ser	Glu	Gln	Gln	Ile	Arg	Gln	Gln	Val	Ala	Phe	Ser	
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Asp	Gly	Phe	Gly	Arg	Leu	Leu	Gln	Ala	Ser	Val	Arg	His	Glu	Ala	
1355						1360					1365				
ggc	gaa	gcc	tgg	caa	cgt	aac	caa	gac	ggt	tct	ctg	gtg	aca	aaa	4149
Gly	Glu	Ala	Trp	Gln	Arg	Asn	Gln	Asp	Gly	Ser	Leu	Val	Thr	Lys	
1370						1375					1380				
gtg	gag	aat	acc	aaa	acg	cgt	tgg	gct	gtc	acg	gga	cgc	acc	gaa	4194
Val	Glu	Asn	Thr	Lys	Thr	Arg	Trp	Ala	Val	Thr	Gly	Arg	Thr	Glu	
1385						1390					1395				
tat	gat	aat	aaa	ggg	caa	acg	ata	cgc	act	tat	cag	ccc	tat	ttc	4239
Tyr	Asp	Asn	Lys	Gly	Gln	Thr	Ile	Arg	Thr	Tyr	Gln	Pro	Tyr	Phe	
1400						1405					1410				
ctc	aac	gac	tgg	cga	tat	gtc	agt	gat	gac	agc	gcc	aga	aaa	gaa	4284
Leu	Asn	Asp	Trp	Arg	Tyr	Val	Ser	Asp	Asp	Ser	Ala	Arg	Lys	Glu	
1415						1420					1425				
gcc	tat	gcg	gat	act	cat	att	tat	gat	cca	att	ggg	cga	gaa	atc	4329
Ala	Tyr	Ala	Asp	Thr	His	Ile	Tyr	Asp	Pro	Ile	Gly	Arg	Glu	Ile	

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cggtt att act gca aaa ggc	tgg ctg cgc caa agc	caa tat ttc	4374
Arg Val Ile Thr Ala Lys Gly	Trp Leu Arg Gln Ser	Gln Tyr Phe	
1445	1450	1455	
ccg tgg ttt acc gtg agt gag	gat gag aat gat acg	gcc gct gat	4419
Pro Trp Phe Thr Val Ser Glu	Asp Glu Asn Asp Thr	Ala Ala Asp	
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Ala Leu Val			
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Pro Asp Gly Met Ala Ala Leu Ser Leu Pro Leu Pro Ile Ser Ala Gly			
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Arg Gly Tyr Ala Pro Ser Leu Thr Leu Asn Tyr Asn Ser Gly Thr Gly			
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Asn Ser Pro Phe Gly Leu Gly Trp Asp Cys Gly Val Met Ala Ile Arg			
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Arg Arg Thr Ser Thr Gly Val Pro Asn Tyr Asp Glu Thr Asp Thr Phe			
85	90	95	
Leu Gly Pro Glu Gly Glu Val Leu Val Val Ala Leu Asn Glu Ala Gly			
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Gln Ala Asp Ile Arg Ser Glu Ser Ser Leu Gln Gly Ile Asn Leu Gly			
115	120	125	
Ala Thr Phe Thr Val Thr Cys Tyr Arg Ser Arg Leu Glu Ser His Phe			
130	135	140	
Asn Arg Leu Glu Tyr Trp Gln Pro Gln Thr Thr Gly Ala Thr Asp Phe			
145	150	155	160
Trp Leu Ile Tyr Ser Pro Asp Gly Gln Val His Leu Leu Gly Lys Asn			
165	170	175	
Pro Gln Ala Arg Ile Ser Asn Pro Leu Asn Val Asn Gln Thr Ala Gln			
180	185	190	
Trp Leu Leu Glu Ala Ser Ile Ser Ser His Ser Glu Gln Ile Tyr Tyr			
195	200	205	

Gln Tyr Arg Ala Glu Asp Glu Ala Gly Cys Glu Thr Asp Glu Leu Ala
210 215 220

Ala His Pro Ser Ala Thr Val Gln Arg Tyr Leu Gln Thr Val His Tyr
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Gly Asn Leu Thr Ala Ser Asp Val Phe Pro Thr Leu Asn Gly Asp Asp
245 250 255

Pro Leu Lys Ser Gly Trp Met Phe Cys Leu Val Phe Asp Tyr Gly Glu
260 265 270

Arg Lys Asn Ser Leu Ser Glu Met Pro Leu Phe Lys Ala Thr Gly Asn
275 280 285

Trp Leu Cys Arg Lys Asp Arg Phe Ser Arg Tyr Glu Tyr Gly Phe Glu
290 295 300

Leu Arg Thr Arg Arg Leu Cys Arg Gln Ile Leu Met Phe His Arg Leu
305 310 315 320

Gln Thr Leu Ser Gly Gln Ala Lys Gly Asp Asp Glu Pro Ala Leu Val
325 330 335

Ser Arg Leu Ile Leu Asp Tyr Asp Glu Asn Ala Met Val Ser Thr Leu
340 345 350

Val Ser Val Arg Arg Val Gly His Glu Asp Asn Asn Thr Val Thr Ala
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Leu Pro Pro Leu Glu Leu Ala Tyr Gln Pro Phe Glu Pro Glu Gln Thr
370 375 380

Ala Leu Trp Gln Ser Met Asp Val Leu Ala Asn Phe Asn Thr Ile Gln
385 390 395 400

Arg Trp Gln Leu Leu Asp Leu Lys Gly Glu Gly Val Pro Gly Ile Leu
405 410 415

Tyr Gln Asp Arg Asn Gly Trp Trp Tyr Arg Ser Ala Gln Arg Gln Ala
420 425 430

Gly Glu Glu Met Asn Ala Val Thr Trp Gly Lys Met Gln Leu Leu Pro
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Ile Thr Pro Ala Val Gln Asp Asn Ala Ser Leu Met Asp Ile Asn Gly
450 455 460

Asp Gly Gln Leu Asp Trp Val Ile Thr Gly Pro Gly Leu Arg Gly Tyr
465 470 475 480

His Ser Gln His Pro Asp Gly Ser Trp Thr Arg Phe Thr Pro Leu His
485 490 495

Ala Leu Pro Ile Glu Tyr Ser His Pro Arg Ala Gln Leu Ala Asp Leu
500 505 510

Met Gly Ala Gly Leu Ser Asp Leu Val Leu Ile Gly Pro Lys Ser Val
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Arg Leu Tyr Val Asn Asn Arg Asp Gly Phe Thr Glu Gly Arg Asp Val

530

535

540

Val Gln Ser Gly Asp Ile Thr Leu Pro Leu Pro Gly Ala Asp Ala Arg
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Lys Leu Val Ala Phe Ser Asp Val Leu Gly Ser Gly Gln Ala His Leu
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Val Glu Val Ser Ala Thr Gln Val Thr Cys Trp Pro Asn Leu Gly His
 580 585 590

Gly Arg Phe Gly Gln Pro Ile Val Leu Pro Gly Phe Ser Gln Ser Ala
 595 600 605

Ala Ser Phe Asn Pro Asp Arg Val His Leu Ala Asp Leu Asp Gly Ser
 610 615 620

Gly Pro Ala Asp Leu Ile Tyr Val His Ala Asp Arg Leu Asp Ile Phe
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Ser Asn Glu Ser Gly Asn Gly Phe Ala Lys Pro Phe Thr Leu Ser Phe
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Pro Asp Gly Leu Arg Phe Asp Asp Thr Cys Gln Leu Gln Val Ala Asp
 660 665 670

Val Gln Gly Leu Gly Val Val Ser Leu Ile Leu Ser Val Pro His Met
 675 680 685

Ala Pro His His Trp Arg Cys Asp Leu Thr Asn Ala Lys Pro Trp Leu
 690 695 700

Leu Ser Glu Thr Asn Asn Met Gly Ala Asn His Thr Leu His Tyr
 705 710 715 720

Arg Ser Ser Val Gln Phe Trp Leu Asp Glu Lys Ala Ala Ala Leu Ala
 725 730 735

Thr Gly Gln Thr Pro Val Cys Tyr Leu Pro Phe Pro Val His Thr Leu
 740 745 750

Trp Gln Thr Glu Thr Glu Asp Glu Ile Ser Gly Asn Lys Leu Val Thr
 755 760 765

Thr Leu Arg Tyr Ala His Gly Ala Trp Asp Gly Arg Glu Arg Glu Phe
 770 775 780

Arg Gly Phe Gly Tyr Val Glu Gln Thr Asp Ser His Gln Leu Ala Gln
 785 790 795 800

Gly Asn Ala Pro Glu Arg Thr Pro Pro Ala Leu Thr Lys Ser Trp Tyr
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Ala Thr Gly Leu Pro Ala Val Asp Asn Ala Leu Ser Ala Gly Tyr Trp
 820 825 830

Arg Gly Asp Lys Gln Ala Phe Ala Gly Phe Thr Pro Arg Phe Thr Leu
 835 840 845

Trp Lys Glu Gly Lys Asp Val Pro Leu Thr Pro Glu Asp Asp His Asn
 850 855 860

Leu Tyr Trp Leu Asn Arg Ala Leu Lys Gly Gln Pro Leu Arg Ser Glu
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 Leu Tyr Gly Leu Asp Gly Ser Ala Gln Gln Gln Ile Pro Tyr Thr Val
 885 890 895
 Thr Glu Ser Arg Pro Gln Val Arg Gln Leu Gln Asp Gly Ala Thr Val
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 Ser Pro Val Leu Trp Ala Ser Val Val Glu Ser Arg Ser Tyr His Tyr
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 Glu Arg Ile Ile Ser Asp Pro Gln Cys Asn Gln Asp Ile Thr Leu Ser
 930 935 940
 Ser Asp Leu Phe Gly Gln Pro Leu Lys Gln Val Ser Val Gln Tyr Pro
 945 950 955 960
 Arg Arg Asn Lys Pro Thr Thr Asn Pro Tyr Pro Asp Thr Leu Pro Asp
 965 970 975
 Thr Leu Phe Ala Ser Ser Tyr Asp Asp Gln Gln Gln Leu Leu Arg Leu
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 Thr Cys Arg Gln Ser Ser Trp His His Leu Ile Gly Asn Glu Leu Arg
 995 1000 1005
 Val Leu Gly Leu Pro Asp Gly Thr Arg Ser Asp Ala Phe Thr Tyr
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 Asp Ala Lys Gln Val Pro Val Asp Gly Leu Asn Leu Glu Thr Leu
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 Cys Ala Glu Asn Ser Leu Ile Ala Asp Asp Lys Pro Arg Glu Tyr
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 Leu Asn Gln Gln Arg Thr Phe Tyr Thr Asp Gly Lys Asn Gln Thr
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 Pro Leu Lys Thr Pro Thr Arg Gln Ala Leu Ile Ala Phe Thr Glu
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 Thr Ala Val Leu Thr Glu Ser Leu Leu Ser Ala Phe Asp Gly Gly
 1085 1090 1095
 Ile Thr Pro Asp Glu Leu Pro Gly Ile Leu Thr Gln Ala Gly Tyr
 1100 1105 1110
 Gln Gln Glu Pro Tyr Leu Phe Pro Arg Thr Gly Glu Asn Lys Val
 1115 1120 1125
 Trp Val Ala Arg Gln Gly Tyr Thr Asp Tyr Gly Thr Glu Ala Gln
 1130 1135 1140
 Phe Trp Arg Pro Val Ala Gln Arg Asn Ser Leu Leu Thr Gly Lys
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 Met Thr Leu Lys Trp Asp Thr His Tyr Cys Val Ile Thr Gln Thr
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Gln Asp Ala Ala Gly Leu Thr Val Ser Ala Asn Tyr Asp Trp Arg
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Phe Leu Thr Pro Thr Gln Leu Thr Asp Ile Asn Asp Asn Val His
1190 1195 1200

Leu Ile Thr Leu Asp Ala Leu Gly Arg Pro Val Thr Gln Arg Phe
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Trp Gly Ile Glu Ser Gly Val Ala Thr Gly Tyr Ser Ser Ser Glu
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Glu Lys Pro Phe Ser Pro Pro Asn Asp Ile Asp Thr Ala Ile Asn
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Leu Thr Gly Pro Leu Pro Val Ala Gln Cys Leu Val Tyr Ala Pro
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Asp Ser Trp Met Pro Leu Phe Ser Gln Glu Thr Phe Asn Thr Leu
1265 1270 1275

Thr Gln Glu Glu Gln Glu Thr Leu Arg Asp Ser Arg Ile Ile Thr
1280 1285 1290

Glu Asp Trp Arg Ile Cys Ala Leu Thr Arg Arg Arg Trp Leu Gln
1295 1300 1305

Ser Gln Lys Ile Ser Thr Pro Leu Val Lys Leu Leu Thr Asn Ser
1310 1315 1320

Ile Gly Leu Pro Pro His Asn Leu Thr Leu Thr Thr Asp Arg Tyr
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Asp Arg Asp Ser Glu Gln Gln Ile Arg Gln Gln Val Ala Phe Ser
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Asp Gly Phe Gly Arg Leu Leu Gln Ala Ser Val Arg His Glu Ala
1355 1360 1365

Gly Glu Ala Trp Gln Arg Asn Gln Asp Gly Ser Leu Val Thr Lys
1370 1375 1380

Val Glu Asn Thr Lys Thr Arg Trp Ala Val Thr Gly Arg Thr Glu
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Tyr Asp Asn Lys Gly Gln Thr Ile Arg Thr Tyr Gln Pro Tyr Phe
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Leu Asn Asp Trp Arg Tyr Val Ser Asp Asp Ser Ala Arg Lys Glu
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Ala Tyr Ala Asp Thr His Ile Tyr Asp Pro Ile Gly Arg Glu Ile
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Arg Val Ile Thr Ala Lys Gly Trp Leu Arg Gln Ser Gln Tyr Phe
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Ala Leu Val

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 Val Leu Asp Asn Arg Lys Leu Asn Val Arg Thr Leu Glu Tyr Leu Arg
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 act caa gct gac gaa aac agt gat gaa tta att acg ttc tat gag ttc 144
 Thr Gln Ala Asp Glu Asn Ser Asp Glu Leu Ile Thr Phe Tyr Glu Phe
 35 40 45

 aat att ccg gga ttt cag gta aaa agc acc gat cct cgt aaa aat aaa 192
 Asn Ile Pro Gly Phe Gln Val Lys Ser Thr Asp Pro Arg Lys Asn Lys
 50 55 60

 aac cag agc ggc cca aat ttc att cgt gtc ttt aat ctt gcc ggt caa 240
 Asn Gln Ser Gly Pro Asn Phe Ile Arg Val Phe Asn Leu Ala Gly Gln
 65 70 75 80

 gtt tta cgt gaa gaa agt gtt gat gcc ggt cgg act att acc ctc aat 288
 Val Leu Arg Glu Ser Val Asp Ala Gly Arg Thr Ile Thr Leu Asn
 85 90 95

 gat att gaa agt cgc ccg gtg ttg atc atc aat gca acc ggt gtc cgc 336
 Asp Ile Glu Ser Arg Pro Val Leu Ile Ile Asn Ala Thr Gly Val Arg
 100 105 110

 caa aac cat cgt tat gaa gat aac acc ctt ccc ggt cgt ctg ctc gct 384
 Gln Asn His Arg Tyr Glu Asp Asn Thr Leu Pro Gly Arg Leu Leu Ala
 115 120 125

 atc acc gaa caa gta cag gca gga gag aaa acg acc gaa cgt ctt atc 432
 Ile Thr Glu Gln Val Gln Ala Gly Glu Lys Thr Thr Glu Arg Leu Ile
 130 135 140

 tgg gcc ggc aat acg ccg caa gaa aaa gat tac aac ctc gcc ggt cag 480
 Trp Ala Gly Asn Thr Pro Gln Glu Lys Asp Tyr Asn Leu Ala Gly Gln
 145 150 155 160

 tgt gtc cgc cat tac gat acc gcg gga ctt act caa ctc aat agc ctt 528
 Cys Val Arg His Tyr Asp Thr Ala Gly Leu Thr Gln Leu Asn Ser Leu
 165 170 175

 tct ctg gct ggc gtc gtg cta tca caa tct caa caa ctg ctt acc gat 576
 Ser Leu Ala Gly Val Val Leu Ser Gln Ser Gln Gln Leu Leu Thr Asp
 180 185 190

aac cag gat gcc gac tgg aca ggt gaa gac cag agc ctc tgg caa caa Asn Gln Asp Ala Asp Trp Thr Gly Glu Asp Gln Ser Leu Trp Gln Gln 195 200 205	624
aaa ctg agt agt gat gtc tat atc acc caa agt aac act gat gcc acc Lys Leu Ser Ser Asp Val Tyr Ile Thr Gln Ser Asn Thr Asp Ala Thr 210 215 220	672
ggg gct tta ctg acc cag acc gat gcc aaa ggc aac att cag cgg ctg Gly Ala Leu Leu Thr Gln Thr Asp Ala Lys Gly Asn Ile Gln Arg Leu 225 230 235 240	720
gcc tat gat gtg gcc ggg cag cta aaa ggg agt tgg tta aca ctc aaa Ala Tyr Asp Val Ala Gly Gln Leu Lys Gly Ser Trp Leu Thr Leu Lys 245 250 255	768
ggc cag gcg gaa cag gtg att atc aaa tcg cta acc tac tcc gcc gcc Gly Gln Ala Glu Gln Val Ile Ile Lys Ser Leu Thr Tyr Ser Ala Ala 260 265 270	816
ggg caa aaa tta cgt gaa gag cac ggt aac ggg att gtc act gaa tac Gly Gln Lys Leu Arg Glu Glu His Gly Asn Gly Ile Val Thr Glu Tyr 275 280 285	864
agc tac gaa ccg gaa acc caa cgg ctt atc ggc att acc act cgc cgt Ser Tyr Glu Pro Glu Thr Gln Arg Leu Ile Gly Ile Thr Thr Arg Arg 290 295 300	912
cca tca gac gcc aag gtg ttg caa gac cta cgc tat caa tat gac cca Pro Ser Asp Ala Lys Val Leu Gln Asp Leu Arg Tyr Gln Tyr Asp Pro 305 310 315 320	960
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tgg cgc aat cag aaa gta gcc ccg gag aat agc tat acc tac gat tcc Trp Arg Asn Gln Lys Val Ala Pro Glu Asn Ser Tyr Thr Tyr Asp Ser 340 345 350	1056
ctg tat cag ctt atc agc gcc acc ggg cgc gaa atg gcc aat atc ggt Leu Tyr Gln Leu Ile Ser Ala Thr Gly Arg Glu Met Ala Asn Ile Gly 355 360 365	1104
cag caa aac aac caa ctt ccc tcc cct gcg cta cct tct gac aac aat Gln Gln Asn Asn Gln Leu Pro Ser Pro Ala Leu Pro Ser Asp Asn Asn 370 375 380	1152
acc tac act aac tat act cgc agc tac agc tat gat cac agt ggt aat Thr Tyr Thr Asn Tyr Thr Arg Ser Tyr Ser Tyr Asp His Ser Gly Asn 385 390 395 400	1200
ctg acg caa att cgg cac agc tcg cca gct acc cag aac aac tac acc Leu Thr Gln Ile Arg His Ser Ser Pro Ala Thr Gln Asn Asn Tyr Thr 405 410 415	1248
gtg gct atc acc ctc tca aac cgc agc aat cgg ggt gtt ctc agt acg Val Ala Ile Thr Leu Ser Asn Arg Ser Asn Arg Gly Val Leu Ser Thr 420 425 430	1296
cta acc acc gat cca aat caa gtg gat acg ttg ttt gat gcc ggt ggt	1344

Leu Thr Thr Asp Pro Asn Gln Val Asp Thr Leu Phe Asp Ala Gly Gly			
435	440	445	
cac caa acc agt tta tta ccc gga cag aca ctt atc tgg aca cca cga			1392
His Gln Thr Ser Leu Leu Pro Gly Gln Thr Leu Ile Trp Thr Pro Arg			
450	455	460	
gga gag tta aag cag gtt aat aat ggc ccg gga aat gag tgg tac cgc			1440
Gly Glu Leu Lys Gln Val Asn Asn Gly Pro Gly Asn Glu Trp Tyr Arg			
465	470	475	480
tac gac agc aac ggc atg aga caa ctg aaa gtg agt gaa cag cca acc			1488
Tyr Asp Ser Asn Gly Met Arg Gln Leu Lys Val Ser Glu Gln Pro Thr			
485	490	495	
cag aat act acg cag caa caa cgg gta atc tat ttg ccg gga ctg gag			1536
Gln Asn Thr Thr Gln Gln Arg Val Ile Tyr Leu Pro Gly Leu Glu			
500	505	510	
cta cgc aca acc cag agc aac gcc aca aca acg gaa gag tta cac gtt			1584
Leu Arg Thr Thr Gln Ser Asn Ala Thr Thr Glu Glu Leu His Val			
515	520	525	
atc aca ctc ggt gaa gcc ggt cgc gca cag gta cgg gtg ttg cac tgg			1632
Ile Thr Leu Gly Glu Ala Gly Arg Ala Gln Val Arg Val Leu His Trp			
530	535	540	
gag agc ggt aag cca gaa gat gtc aac aat aat caa cta cgt tac agc			1680
Glu Ser Gly Lys Pro Glu Asp Val Asn Asn Asn Gln Leu Arg Tyr Ser			
545	550	555	560
tac gat aat ctg atc ggc tcc agc cag ctt gaa ctg gac aac caa gga			1728
Tyr Asp Asn Leu Ile Gly Ser Ser Gln Leu Glu Leu Asp Asn Gln Gly			
565	570	575	
caa att atc agc gag gaa gag tat tat cca ttt ggc ggg aca gcg ctg			1776
Gln Ile Ile Ser Glu Glu Tyr Tyr Pro Phe Gly Gly Thr Ala Leu			
580	585	590	
tgg gca gca aac agc caa aca gaa gcc agc tat aaa acg att cgc tat			1824
Trp Ala Ala Asn Ser Gln Thr Glu Ala Ser Tyr Lys Thr Ile Arg Tyr			
595	600	605	
tcc ggc aaa gaa cga gat gcc acc ggg ttg tat tat tac ggt tat cgt			1872
Ser Gly Lys Glu Arg Asp Ala Thr Gly Leu Tyr Tyr Gly Tyr Arg			
610	615	620	
tat tac caa ccg tgg gcg ggc aga tgg tta agc gcg gac ccg gca gga			1920
Tyr Tyr Gln Pro Trp Ala Gly Arg Trp Leu Ser Ala Asp Pro Ala Gly			
625	630	635	640
acc att gat ggg ctg aat cta tac cga atg gta aga aat aat cct gtg			1968
Thr Ile Asp Gly Leu Asn Leu Tyr Arg Met Val Arg Asn Asn Pro Val			
645	650	655	
agt tta caa gat gaa aat gga tta gcg cca gaa aaa ggg aaa tat acc			2016
Ser Leu Gln Asp Glu Asn Gly Leu Ala Pro Glu Lys Gly Lys Tyr Thr			
660	665	670	
aaa gag gta aat ttc ttt gat gaa tta aaa ttc aaa ttg gca gcc aaa			2064
Lys Glu Val Asn Phe Phe Asp Glu Leu Lys Phe Lys Leu Ala Ala Lys			

675	680	685	
agt tca cat gtt gtc aaa tgg aac gag aaa gag agc agt tat aca aaa Ser Ser His Val Val Lys Trp Asn Glu Lys Glu Ser Ser Tyr Thr Lys 690 695 700			2112
aat aaa tca ttg aaa gtg gtt cgt gtc ggt gat tcc gat ccg tcg ggt Asn Lys Ser Leu Lys Val Val Arg Val Gly Asp Ser Asp Pro Ser Gly 705 710 715 720			2160
tat ttg cta agc cac gaa gag tta cta aaa ggt ata gaa aaa agt caa Tyr Leu Leu Ser His Glu Glu Leu Leu Lys Gly Ile Glu Lys Ser Gln 725 730 735			2208
atc ata tat agc cga ctt gaa gaa aac agc tcc ctt tca gaa aaa tca Ile Ile Tyr Ser Arg Leu Glu Asn Ser Ser Leu Ser Glu Lys Ser 740 745 750			2256
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acc ata caa gat acg ata tca gaa tat gcc gaa gag cat aaa tat aga Thr Ile Gln Asp Thr Ile Ser Glu Tyr Ala Glu Glu His Lys Tyr Arg 770 775 780			2352
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gat aaa agt gaa aaa aat gat tat tcc ggt gaa aga aaa att tat gcg Asp Lys Ser Glu Lys Asn Asp Tyr Ser Gly Glu Arg Lys Ile Tyr Ala 805 810 815			2448
gca atg gag gtt aag gtt tat cat gat tta aaa aat aaa caa tca gaa Ala Met Glu Val Lys Val Tyr His Asp Leu Lys Asn Lys Gln Ser Glu 820 825 830			2496
tta cat gtc aac tat gca ttg gcc cat ccc tat acg caa ttg agt aat Leu His Val Asn Tyr Ala Leu Ala His Pro Tyr Thr Gln Leu Ser Asn 835 840 845			2544
gaa gaa aga gcg ctg ttg caa gaa aca gaa ccc gct att gca ata gat Glu Glu Arg Ala Leu Leu Gln Glu Thr Glu Pro Ala Ile Ala Ile Asp 850 855 860			2592
aga gaa tat aat ttc aaa ggt gtt ggc aaa ttc ctg aca atg aaa gca Arg Glu Tyr Asn Phe Lys Gly Val Gly Lys Phe Leu Thr Met Lys Ala 865 870 875 880			2640
att aaa aaa tca ttg aaa gga cat aaa att aat agg ata tca aca gag Ile Lys Lys Ser Leu Lys Gly His Lys Ile Asn Arg Ile Ser Thr Glu 885 890 895			2688
gct att aat att cgc tct gcg gct atc gct gag aat tta gga atg cgg Ala Ile Asn Ile Arg Ser Ala Ala Ile Ala Glu Asn Leu Gly Met Arg 900 905 910			2736
aga act tca Arg Thr Ser 915			2745

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														30	
Thr	Gln	Ala	Asp	Glu	Asn	Ser	Asp	Glu	Leu	Ile	Thr	Phe	Tyr	Glu	Phe
														45	
Asn	Ile	Pro	Gly	Phe	Gln	Val	Lys	Ser	Thr	Asp	Pro	Arg	Lys	Asn	Lys
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Asn	Gln	Ser	Gly	Pro	Asn	Phe	Ile	Arg	Val	Phe	Asn	Leu	Ala	Gly	Gln
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Val	Leu	Arg	Glu	Glu	Ser	Val	Asp	Ala	Gly	Arg	Thr	Ile	Thr	Leu	Asn
														95	
Asp	Ile	Glu	Ser	Arg	Pro	Val	Leu	Ile	Ile	Asn	Ala	Thr	Gly	Val	Arg
														110	
Gln	Asn	His	Arg	Tyr	Glu	Asp	Asn	Thr	Leu	Pro	Gly	Arg	Leu	Leu	Ala
														125	
Ile	Thr	Glu	Gln	Val	Gln	Ala	Gly	Glu	Lys	Thr	Thr	Glu	Arg	Leu	Ile
														140	
Trp	Ala	Gly	Asn	Thr	Pro	Gln	Glu	Lys	Asp	Tyr	Asn	Leu	Ala	Gly	Gln
														160	
Cys	Val	Arg	His	Tyr	Asp	Thr	Ala	Gly	Leu	Thr	Gln	Leu	Asn	Ser	Leu
														175	
Ser	Leu	Ala	Gly	Val	Val	Leu	Ser	Gln	Ser	Gln	Gln	Leu	Leu	Thr	Asp
														190	
Asn	Gln	Asp	Ala	Asp	Trp	Thr	Gly	Glu	Asp	Gln	Ser	Leu	Trp	Gln	Gln
														205	
Lys	Leu	Ser	Ser	Asp	Val	Tyr	Ile	Thr	Gln	Ser	Asn	Thr	Asp	Ala	Thr
														210	
Gly	Ala	Leu	Leu	Thr	Gln	Thr	Asp	Ala	Lys	Gly	Asn	Ile	Gln	Arg	Leu
														240	
225															
Ala	Tyr	Asp	Val	Ala	Gly	Gln	Leu	Lys	Gly	Ser	Trp	Leu	Thr	Leu	Lys
														255	
245															
Gly	Gln	Ala	Glu	Gln	Val	Ile	Ile	Lys	Ser	Leu	Thr	Tyr	Ser	Ala	Ala
														260	
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														270	

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Pro Ser Asp Ala Lys Val Leu Gln Asp Leu Arg Tyr Gln Tyr Asp Pro		
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Val Gly Asn Val Ile Asn Ile Arg Asn Asp Ala Glu Ala Thr Arg Phe		
325	330	335
Trp Arg Asn Gln Lys Val Ala Pro Glu Asn Ser Tyr Thr Tyr Asp Ser		
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Leu Tyr Gln Leu Ile Ser Ala Thr Gly Arg Glu Met Ala Asn Ile Gly		
355	360	365
Gln Gln Asn Asn Gln Leu Pro Ser Pro Ala Leu Pro Ser Asp Asn Asn		
370	375	380
Thr Tyr Thr Asn Tyr Thr Arg Ser Tyr Ser Tyr Asp His Ser Gly Asn		
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Leu Thr Gln Ile Arg His Ser Ser Pro Ala Thr Gln Asn Asn Tyr Thr		
405	410	415
Val Ala Ile Thr Leu Ser Asn Arg Ser Asn Arg Gly Val Leu Ser Thr		
420	425	430
Leu Thr Thr Asp Pro Asn Gln Val Asp Thr Leu Phe Asp Ala Gly Gly		
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His Gln Thr Ser Leu Leu Pro Gly Gln Thr Leu Ile Trp Thr Pro Arg		
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Gly Glu Leu Lys Gln Val Asn Asn Gly Pro Gly Asn Glu Trp Tyr Arg		
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Tyr Asp Ser Asn Gly Met Arg Gln Leu Lys Val Ser Glu Gln Pro Thr		
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Gln Asn Thr Thr Gln Gln Gln Arg Val Ile Tyr Leu Pro Gly Leu Glu		
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Leu Arg Thr Thr Gln Ser Asn Ala Thr Thr Glu Glu Leu His Val		
515	520	525
Ile Thr Leu Gly Glu Ala Gly Arg Ala Gln Val Arg Val Leu His Trp		
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Glu Ser Gly Lys Pro Glu Asp Val Asn Asn Asn Gln Leu Arg Tyr Ser		
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Gln Ile Ile Ser Glu Glu Tyr Tyr Pro Phe Gly Gly Thr Ala Leu		
580	585	590
Trp Ala Ala Asn Ser Gln Thr Glu Ala Ser Tyr Lys Thr Ile Arg Tyr		
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 Lys Glu Val Asn Phe Phe Asp Glu Leu Lys Phe Lys Leu Ala Ala Lys
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 915

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<211> 2504

<212> PRT

<213> *Photorhabdus luminescens*

<400> 8

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Gln Leu Thr Cys Pro Ala Glu Ile Ala Leu Tyr Pro Phe Asp Thr Phe	
20	25
30	

Arg Glu Lys Thr Arg Gly Met Val Asn Trp Gly Glu Ala Lys Arg Ile	
35	40
45	

Tyr Glu Ile Ala Gln Ala Glu Gln Asp Arg Asn Leu Leu His Glu Lys	
50	55
60	

Arg Ile Phe Ala Tyr Ala Asn Pro Leu Leu Lys Asn Ala Val Arg Leu	
65	70
75	80

Gly Thr Arg Gln Met Leu Gly Phe Ile Gln Gly Tyr Ser Asp Leu Phe	
85	90
95	

Gly Asn Arg Ala Asp Asn Tyr Ala Ala Pro Gly Ser Val Ala Ser Met	
100	105
110	

Phe Ser Pro Ala Ala Tyr Leu Thr Glu Leu Tyr Arg Glu Ala Lys Asn	
115	120
125	

Leu His Asp Ser Ser Ser Ile Tyr Tyr Leu Asp Lys Arg Arg Pro Asp	
130	135
140	

Leu Ala Ser Leu Met Leu Ser Gln Lys Asn Met Asp Glu Glu Ile Ser	
145	150
155	160

Thr Leu Ala Leu Ser Asn Glu Leu Cys Leu Ala Gly Ile Glu Thr Lys	
165	170
175	

Thr Gly Lys Ser Gln Asp Glu Val Met Asp Met Leu Ser Thr Tyr Arg
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 Leu Ser Gly Glu Thr Pro Tyr His His Ala Tyr Glu Thr Val Arg Glu
 195 200 205
 Ile Val His Glu Arg Asp Pro Gly Phe Arg His Leu Ser Gln Ala Pro
 210 215 220
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 225 230 235 240
 His Ile Ser Pro Glu Leu Tyr Asn Leu Leu Ile Glu Glu Ile Pro Glu
 245 250 255
 Lys Asp Glu Ala Ala Leu Asp Thr Leu Tyr Lys Thr Asn Phe Gly Asp
 260 265 270
 Ile Thr Thr Ala Gln Leu Met Ser Pro Ser Tyr Leu Ala Arg Tyr Tyr
 275 280 285
 Gly Val Ser Pro Glu Asp Ile Ala Tyr Val Thr Thr Ser Leu Ser His
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 370 375 380
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 Thr Ile Lys Arg Ser Asp Ser Asp Asn Ile Leu Ser Ile Gly Leu Gln
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 Arg Trp His Ser Gly Ser Tyr Asn Phe Ala Ala Ala Asn Phe Lys Ile
 420 425 430
 Asp Gln Tyr Ser Pro Lys Ala Phe Leu Leu Lys Met Asn Lys Ala Ile
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 Arg Leu Leu Lys Ala Thr Gly Leu Ser Phe Ala Thr Leu Glu Arg Ile
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 Val Asp Ser Val Asn Ser Thr Lys Ser Ile Thr Val Glu Val Leu Asn
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 485 490 495
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Lys Ala Val Leu Lys Arg Ala Phe Gln Val Asn Ala Ser Glu Leu Tyr		
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Gln Met Leu Leu Ile Thr Asp Arg Lys Glu Asp Gly Val Ile Lys Asn		
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Asn Leu Glu Asn Leu Ser Asp Leu Tyr Leu Val Ser Leu Leu Ala Gln		
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Ile His Asn Leu Thr Ile Ala Glu Leu Asn Ile Leu Leu Val Ile Cys		
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Gly Tyr Gly Asp Thr Asn Ile Tyr Gln Ile Thr Asp Asp Asn Leu Ala		
625	630	635
Lys Ile Val Glu Thr Leu Leu Trp Ile Thr Gln Trp Leu Lys Thr Gln		
645	650	655
Lys Trp Thr Val Thr Asp Leu Phe Leu Met Thr Thr Ala Thr Tyr Ser		
660	665	670
Thr Thr Leu Thr Pro Glu Ile Ser Asn Leu Thr Ala Thr Leu Ser Ser		
675	680	685
Thr Leu His Gly Lys Glu Ser Leu Ile Gly Glu Asp Leu Lys Arg Ala		
690	695	700
Met Ala Pro Cys Phe Thr Ser Ala Leu His Leu Thr Ser Gln Glu Val		
705	710	720
Ala Tyr Asp Leu Leu Trp Ile Asp Gln Ile Gln Pro Ala Gln Ile		
725	730	735
Thr Val Asp Gly Phe Trp Glu Glu Val Gln Thr Thr Pro Thr Ser Leu		
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Lys Val Ile Thr Phe Ala Gln Val Leu Ala Gln Leu Ser Leu Ile Tyr		
755	760	765
Arg Arg Ile Gly Leu Ser Glu Thr Glu Leu Ser Leu Ile Val Thr Gln		
770	775	780
Ser Ser Leu Leu Val Ala Gly Lys Ser Ile Leu Asp His Gly Leu Leu		
785	790	795
Thr Leu Met Ala Leu Glu Gly Phe His Thr Trp Val Asn Gly Leu Gly		
805	810	815
Gln His Ala Ser Leu Ile Leu Ala Ala Leu Lys Asp Gly Ala Leu Thr		
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Val Thr Asp Val Ala Gln Ala Met Asn Lys Glu Glu Ser Leu Leu Gln
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 Ala Val Ser Pro Leu Asp Leu Ala Gly Met Met Ala Leu Lys Tyr Gly
 885 890 895
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 Gly Val Arg Asp Arg Asn Gly Leu Tyr Thr Tyr Leu Leu Ile Asp Asn
 945 950 955 960
 Gln Val Ser Ala Asp Val Ile Thr Ser Arg Ile Ala Glu Ala Ile Ala
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 Gly Ile Gln Leu Tyr Val Asn Arg Ala Leu Asn Arg Asp Glu Gly Gln
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 Tyr Asn Lys Arg Tyr Ser Thr Trp Ala Gly Val Ser Glu Leu Val
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 Thr Lys Met Met Asp Ala Leu Leu Gln Ser Ile Asn Gln Ser Gln
 1040 1045 1050
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 1085 1090 1095
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Asp	Asp	Asn	Lys	Thr	Ala	Asp	Tyr	Asn	Gly	Gly	Thr	Gln	Cys	Ile
1430						1435						1440		
Asp	Ala	Gly	Thr	Ser	Asn	Lys	Asp	Phe	Tyr	Tyr	Asn	Leu	Gln	Glu

1445	1450	1455
Ile Glu Val Ile Ser Val Thr	Gly Gly Tyr Trp Ser	Ser Tyr Lys
1460	1465	1470
Ile Ser Asn Pro Ile Asn Ile	Asn Thr Gly Ile Asp	Ser Ala Lys
1475	1480	1485
Val Lys Val Thr Val Lys Ala	Gly Gly Asp Asp Gln	Ile Phe Thr
1490	1495	1500
Ala Asp Asn Ser Thr Tyr Val	Pro Gln Gln Pro Ala	Pro Ser Phe
1505	1510	1515
Glu Glu Met Ile Tyr Gln Phe	Asn Asn Leu Thr Ile	Asp Cys Lys
1520	1525	1530
Asn Leu Asn Phe Ile Asp Asn	Gln Ala His Ile Glu	Ile Asp Phe
1535	1540	1545
Thr Ala Thr Ala Gln Asp Gly	Arg Phe Leu Gly Ala	Glu Thr Phe
1550	1555	1560
Ile Ile Pro Val Thr Lys Lys	Val Leu Gly Thr Glu	Asn Val Ile
1565	1570	1575
Ala Leu Tyr Ser Glu Asn Asn	Gly Val Gln Tyr Met	Gln Ile Gly
1580	1585	1590
Ala Tyr Arg Thr Arg Leu Asn	Thr Leu Phe Ala Gln	Gln Leu Val
1595	1600	1605
Ser Arg Ala Asn Arg Gly Ile	Asp Ala Val Leu Ser	Met Glu Thr
1610	1615	1620
Gln Asn Ile Gln Glu Pro Gln	Leu Gly Ala Gly Thr	Tyr Val Gln
1625	1630	1635
Leu Val Leu Asp Lys Tyr Asp	Glu Ser Ile His Gly	Thr Asn Lys
1640	1645	1650
Ser Phe Ala Ile Glu Tyr Val	Asp Ile Phe Lys Glu	Asn Asp Ser
1655	1660	1665
Phe Val Ile Tyr Gln Gly Glu	Leu Ser Glu Thr Ser	Gln Thr Val
1670	1675	1680
Val Lys Val Phe Leu Ser Tyr	Phe Ile Glu Ala Thr	Gly Asn Lys
1685	1690	1695
Asn His Leu Trp Val Arg Ala	Lys Tyr Gln Lys Glu	Thr Thr Asp
1700	1705	1710
Lys Ile Leu Phe Asp Arg Thr	Asp Glu Lys Asp Pro	His Gly Trp
1715	1720	1725
Phe Leu Ser Asp Asp His Lys	Thr Phe Ser Gly Leu	Ser Ser Ala
1730	1735	1740
Gln Ala Leu Lys Asn Asp Ser	Glu Pro Met Asp Phe	Ser Gly Ala
1745	1750	1755

Asn	Ala	Leu	Tyr	Phe	Trp	Glu	Leu	Phe	Tyr	Tyr	Thr	Pro	Met	Met
1760						1765						1770		
Met	Ala	His	Arg	Leu	Leu	Gln	Glu	Gln	Asn	Phe	Asp	Ala	Ala	Asn
1775						1780						1785		
His	Trp	Phe	Arg	Tyr	Val	Trp	Ser	Pro	Ser	Gly	Tyr	Ile	Val	Asp
1790						1795						1800		
Gly	Lys	Ile	Ala	Ile	Tyr	His	Trp	Asn	Val	Arg	Pro	Leu	Glu	Glu
1805						1810						1815		
Asp	Thr	Ser	Trp	Asn	Ala	Gln	Gln	Leu	Asp	Ser	Thr	Asp	Pro	Asp
1820						1825						1830		
Ala	Val	Ala	Gln	Asp	Asp	Pro	Met	His	Tyr	Lys	Val	Ala	Thr	Phe
1835						1840						1845		
Met	Ala	Thr	Leu	Asp	Leu	Leu	Met	Ala	Arg	Gly	Asp	Ala	Ala	Tyr
1850						1855						1860		
Arg	Gln	Leu	Glu	Arg	Asp	Thr	Leu	Ala	Glu	Ala	Lys	Met	Trp	Tyr
1865						1870						1875		
Thr	Gln	Ala	Leu	Asn	Leu	Leu	Gly	Asp	Glu	Pro	Gln	Val	Met	Leu
1880						1885						1890		
Ser	Thr	Thr	Trp	Ala	Asn	Pro	Thr	Leu	Gly	Asn	Ala	Ala	Ser	Lys
1895						1900						1905		
Thr	Thr	Gln	Gln	Val	Arg	Gln	Gln	Val	Leu	Thr	Gln	Leu	Arg	Leu
1910						1915						1920		
Asn	Ser	Arg	Val	Lys	Thr	Pro	Leu	Leu	Gly	Thr	Ala	Asn	Ser	Leu
1925						1930						1935		
Thr	Ala	Leu	Phe	Leu	Pro	Gln	Glu	Asn	Ser	Lys	Leu	Lys	Gly	Tyr
1940						1945						1950		
Trp	Arg	Thr	Leu	Ala	Gln	Arg	Met	Phe	Asn	Leu	Arg	His	Asn	Leu
1955						1960						1965		
Ser	Ile	Asp	Gly	Gln	Pro	Leu	Ser	Leu	Pro	Leu	Tyr	Ala	Lys	Pro
1970						1975						1980		
Ala	Asp	Pro	Lys	Ala	Leu	Leu	Ser	Ala	Ala	Val	Ser	Ala	Ser	Gln
1985						1990						1995		
Gly	Gly	Ala	Asp	Leu	Pro	Lys	Ala	Pro	Leu	Thr	Ile	His	Arg	Phe
2000						2005						2010		
Pro	Gln	Met	Leu	Glu	Gly	Ala	Arg	Gly	Leu	Val	Asn	Gln	Leu	Ile
2015						2020						2025		
Gln	Phe	Gly	Ser	Ser	Leu	Leu	Gly	Tyr	Ser	Glu	Arg	Gln	Asp	Ala
2030						2035						2040		
Glu	Ala	Met	Ser	Gln	Leu	Leu	Gln	Thr	Gln	Ala	Ser	Glu	Leu	Ile
2045						2050						2055		

Leu Thr Ser Ile Arg Met Gln Asp Asn Gln Leu Ala Glu Leu Asp
 2060 2065 2070

Ser Glu Lys Thr Ala Leu Gln Val Ser Leu Ala Gly Val Gln Gln
 2075 2080 2085

Arg Phe Asp Ser Tyr Ser Gln Leu Tyr Glu Glu Asn Ile Asn Ala
 2090 2095 2100

Gly Glu Gln Arg Ala Leu Ala Leu Arg Ser Glu Ser Ala Ile Glu
 2105 2110 2115

Ser Gln Gly Ala Gln Ile Ser Arg Met Ala Gly Ala Gly Val Asp
 2120 2125 2130

Met Ala Pro Asn Ile Phe Gly Leu Ala Asp Gly Gly Met His Tyr
 2135 2140 2145

Gly Ala Ile Ala Tyr Ala Ile Ala Asp Gly Ile Glu Leu Ser Ala
 2150 2155 2160

Ser Ala Lys Met Val Asp Ala Glu Lys Val Ala Gln Ser Glu Ile
 2165 2170 2175

Tyr Arg Arg Arg Arg Gln Glu Trp Lys Ile Gln Arg Asp Asn Ala
 2180 2185 2190

Gln Ala Glu Ile Asn Gln Leu Asn Ala Gln Leu Glu Ser Leu Ser
 2195 2200 2205

Ile Arg Arg Glu Ala Ala Glu Met Gln Lys Glu Tyr Leu Lys Thr
 2210 2215 2220

Gln Gln Ala Gln Ala Gln Ala Gln Leu Thr Phe Leu Arg Ser Lys
 2225 2230 2235

Phe Ser Asn Gln Ala Leu Tyr Ser Trp Leu Arg Gly Arg Leu Ser
 2240 2245 2250

Gly Ile Tyr Phe Gln Phe Tyr Asp Leu Ala Val Ser Arg Cys Leu
 2255 2260 2265

Met Ala Glu Gln Ser Tyr Gln Trp Glu Ala Asn Asp Asn Ser Ile
 2270 2275 2280

Ser Phe Val Lys Pro Gly Ala Trp Gln Gly Thr Tyr Ala Gly Leu
 2285 2290 2295

Leu Cys Gly Glu Ala Leu Ile Gln Asn Leu Ala Gln Met Glu Glu
 2300 2305 2310

Ala Tyr Leu Lys Trp Glu Ser Arg Ala Leu Glu Val Glu Arg Thr
 2315 2320 2325

Val Ser Leu Ala Val Val Tyr Asp Ser Leu Glu Gly Asn Asp Arg
 2330 2335 2340

Phe Asn Leu Ala Glu Gln Ile Pro Ala Leu Leu Asp Lys Gly Glu
 2345 2350 2355

Gly Thr Ala Gly Thr Lys Glu Asn Gly Leu Ser Leu Ala Asn Ala

2360	2365	2370
Ile Leu Ser Ala Ser Val Lys	Leu Ser Asp Leu Lys	Leu Gly Thr
2375	2380	2385
Asp Tyr Pro Asp Ser Ile Val	Gly Ser Asn Lys Val	Arg Arg Ile
2390	2395	2400
Lys Gln Ile Ser Val Ser Leu	Pro Ala Leu Val Gly	Pro Tyr Gln
2405	2410	2415
Asp Val Gln Ala Met Leu Ser	Tyr Gly Gly Ser Thr	Gln Leu Pro
2420	2425	2430
Lys Gly Cys Ser Ala Leu Ala	Val Ser His Gly Thr	Asn Asp Ser
2435	2440	2445
Gly Gln Phe Gln Leu Asp Phe	Asn Asp Gly Lys Tyr	Leu Pro Phe
2450	2455	2460
Glu Gly Ile Ala Leu Asp Asp	Gln Gly Thr Leu Asn	Leu Gln Phe
2465	2470	2475
Pro Asn Ala Thr Asp Lys Gln	Lys Ala Ile Leu Gln	Thr Met Ser
2480	2485	2490
Asp Ile Ile Leu His Ile Arg	Tyr Thr Ile Arg	
2495	2500	